All India Test Series (2023-24)

Test Code: ANY/04

AITS TEST - 04

YAKEEN NEET

DURATION: 200 Minutes | **DATE: 03/03/2024** | **M. MARKS: 720**

Topics Covered

Physics:	AITS-3 + Electric charges and field, Electrostatic potential and Capacitance, Gravitation, Current Electricity (Excluding Carbon resistor and Potentiometer)
Chemistry:	AITS-3 + Solutions, Classification of elements and periodicity in properties, Haloalkanes & Haloarenes
Botany:	AITS-3 + Plant Growth and Development, Sexual Reproduction in Flowering Plants, Molecular Basis of Inheritance
Zoology:	AITS-3 + Animal Kingdom, Biomolecules (Zoology)

General Instructions:

1. Immediately fill in the particulars on this page of the test booklet.
2. The test is of **3 hours 20 minutes** duration and the Test Booklet contains **200** multiple choice questions (four options with a single correct answer) from **Physics, Chemistry and Biology (Botany and Zoology)**. **50** questions in each subject are divided into **two sections (A and B)** as per details given below:
   (a) **Section A** shall consist of **35 (Thirty-five)** Questions in each subject (Question Nos. – 1 to 35, 51 to 85, 101 to 135 and 151 to 185). All Questions are compulsory.
   (b) **Section B** shall consist of **15 (Fifteen)** questions in each subject (Question Nos. – 36 to 50, 86 to 100, 136 to 150 and 186 to 200). In section B, a candidate needs to **attempt any 10 (Ten)** questions out of **15 (Fifteen)** in each subject.
   Candidates are advised to read all 15 questions in each subject of Section-B before they start attempting the question paper. In the event of a candidate attempting more than ten questions, **the first ten questions answered by the candidate shall be evaluated.**
3. There is only one correct response for each question.
4. Each **correct** answer will give **4 Mark** while **1 Mark** will be **deducted** for a **wrong** answer. The maximum marks are 720.
5. No student is allowed to carry any textual material, printed or written, bits of papers, pager, mobile phone, any electronic device, etc. inside the examination room/hall.
6. On completion of the test, the candidate must hand over the Answer Sheet to the Invigilator on duty in the Room/Hall. However, the candidates are allowed to take away this Test Booklet with them.

OMR Instructions:

1. Use blue/black dark ballpoint pen.
2. Darken the bubbles completely. Don't put a tick mark or a cross mark where it is specified that you fill the bubbles completely. Half-filled or over-filled bubbles will not be read by the software.
3. Never use pencils to mark your answers.
4. Never use whiteners to rectify filling errors as they may disrupt the scanning and evaluation process.
5. Writing on the OMR Sheet is permitted on the specified area only and even small marks other than the specified area may create problems during the evaluation.
6. Multiple markings will be treated as invalid responses.
7. **Do not fold or make any stray mark on the Answer Sheet (OMR).**

Name of the Student (In CAPITALS): _____

Roll Number: _____

OMR Bar Code Number: _____

Student's Signature: _____ Invigilator's Signature _____

(PHYSICS)

SECTION-A

1. At $t = 0$, a travelling wave pulse on a string is described by the function: $y = \frac{4}{x^2 + 5}$

Which of the following is the **correct** wave function representing the pulse at time t, if the pulse is propagating along positive x-axis with speed 3 m/s?

(1) $y = \frac{4}{(x + 3t)^2 + 5}$

(2) $y = \frac{4}{(x - 3t)^2 + 5}$

(3) $y = \frac{4}{(x - t)^2}$

(4) $y = \frac{4}{(x - t)^2 + 5}$

2. Two parallel plates have equal and opposite charges. When the space between the plates is evacuated, the magnitude of electric field in between the plates is $E_0 = 4.80 \times 10^5$ V/m. When the space is completely filled with dielectric, the magnitude of electric field becomes 2.60×10^5 V/m. What is the dielectric constant?

(1) 1.25
(2) 1.85
(3) 1.96
(4) 2.36

3. The gravitational potential in a region is given by, $V = 30\ (x - y)$ J/kg. The magnitude of the gravitational force on a particle of mass 0.2 kg placed at the origin is;

(1) $\sqrt{2}$ N
(2) 2 N
(3) 6 N
(4) $6\sqrt{2}$ N

4. An electric field of 10^4 N/C points due east at a certain point. The magnitude and direction of the force that acts on a point charge of +4 μC and −3μC at this point are respectively;

(1) 0.04 N due east and 0.03 N due west
(2) 0.04 N due west and 0.03 N due east
(3) 0.03 N due east and 0.04 N due west
(4) 0.03 N due west and 0.04 N due east

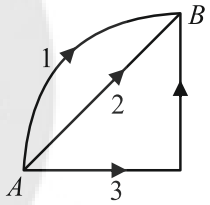
5. The current through a wire depends on time as, $i = (5 + 3t^2)$. Here, i is in ampere and t in seconds. The charge crossing through any cross-section in time interval between $t = 0$ to $t = 5$ s is;

(1) 100 C (2) 120 C
(3) 150 C (4) 185 C

6. The electric field in a region is expressed as: $\vec{E} = \frac{2}{5}E_0\hat{i} + \frac{3}{5}E_0\hat{j}$, where $E_0 = 3 \times 10^3$ N/C. What is the flux due to this field through a rectangular surface of area 0.5 m^2 parallel to the X-Z plane?

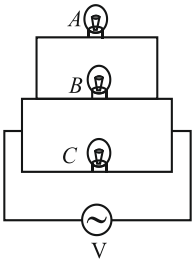
(1) 600 Nm^2C^{-1} (2) 700 Nm^2C^{-1}
(3) 800 Nm^2C^{-1} (4) 900 Nm^2C^{-1}

7. The image below shows work done in taking a unit positive charge from point A to point B inside an electric field present in space via three different paths. If W_1, W_2 and W_3 represent the work done by electric forces along the paths labelled as 1, 2 and 3 respectively then;



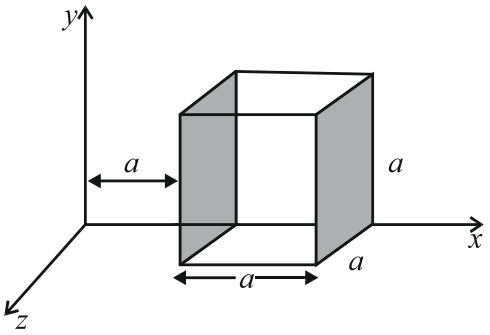
(1) $W_1 = W_2 < W_3$
(2) $W_1 < W_2 < W_3$
(3) $W_1 > W_2 > W_3$
(4) $W_1 = W_2 = W_3$

8. Three bulbs A, B and C of power rating (320 W, 220 V), (280 W, 220 V) and (260 W, 220 V) respectively are connected across a 220 V source as shown in the figure. Identify the **correct** statement for the given circuit.



(1) All the bulbs will glow with the same brightness.
(2) The brightness of bulb A will be more than that of bulb B but less than that of bulb C.
(3) The brightness of bulb B will be more than that of both bulbs A and C.
(4) The brightness of bulb A will be more than that of both bulbs B and C.

9. The electric field components of the field shown in figure are $E_x = \alpha x^2$, $E_y = E_z = 0$, in which $\alpha = 4$ N/Cm^2. The charge within the cube is; (Assume $a = 1$ m)

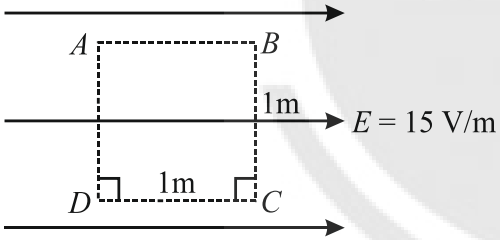


(1) 8.26×10^{-12} C
(2) 8.26×10^{-11} C
(3) 10.62×10^{-11} C
(4) 10.62×10^{-12} C

10. A 0.5 kg body performs simple harmonic motion with a frequency of 4 Hz and an amplitude of 4 mm. The maximum restoring force to which the body is subjected to is;

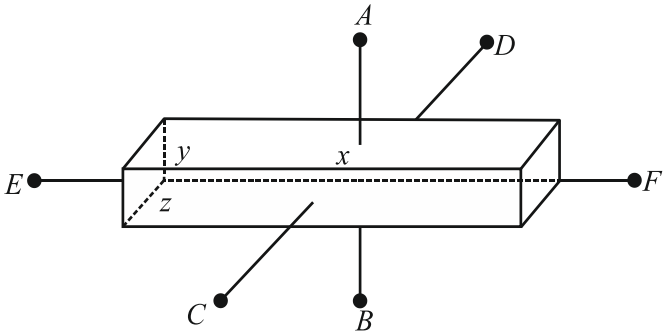
(1) 2.524 N (2) 1.262 N
(3) 1.349 N (4) 0.631 N

11. Which of the following options is **INCORRECT** for the potential difference in the uniform electric field shown in figure?



(1) $V_A - V_D = 0$ V
(2) $V_B - V_C = 0$ V
(3) $V_A - V_B = 15$ V
(4) $V_C - V_D = 15$ V

12. The dimensions of a conductor of specific resistance ρ are shown below as x, y and z.



The ratio of the resistance of the conductor across AB and EF is;

(1) z : x (2) x : z
(3) $y^2 : x^2$ (4) $z^2 : x^2$

13. Two positive charges, each of magnitude q are $2d$ distance apart. A negative charge $-q$ is lying exactly in between them. The potential energy of the system is U_1. If the two nearest charges are mutually interchanged, the potential energy becomes U_2, then the ratio $U_1 : U_2$ is;

(1) 1 : 3
(2) 1 : 2
(3) 2 : 1
(4) 3 : 1

14. The mass and diameter of a planet are three times those of earth. What will be the period of oscillation of a second's pendulum on this planet?

(1) $\sqrt{3}$ s
(2) $2\sqrt{3}$ s
(3) $\frac{1}{\sqrt{3}}$ s
(4) $\frac{1}{2\sqrt{3}}$ s

15. When a wire carries a current of 5.40 A, the drift velocity of electrons is 1.20×10^{-4} m/s. If the current in the same wire is decreased to 1.80 A, then the drift velocity of electrons will be;

(1) 4.80×10^{-4} m/s
(2) 3.60×10^{-4} m/s
(3) 1.20×10^{-4} m/s
(4) 0.40×10^{-4} m/s

16. When a system goes from thermodynamic state A to state B, it is supplied with 350 J of heat and it does 150 J of work. If the same system now moves from thermodynamic state B to A, what is the change in internal energy?

(1) 200 J
(2) 400 J
(3) –200 J
(4) –400 J

17. Heater A takes 4 minutes to boil a given amount of water and heater B takes 8 minutes to boil the same amount of water with the same source. Find the time taken to boil the same amount of water if both the heaters are connected in parallel with the same source.

(1) 4 minutes
(2) $\frac{3}{8}$ minutes
(3) 12 minutes
(4) $\frac{8}{3}$ minutes

18. A charge q = 1 μC is placed at point Q (2m, 1m, 3m). The electric field at point P (1m, –2m, 2m) is; (Take $\sqrt{1331} = 36.5$)

(1) $219.6(-\hat{i} + \hat{j} + \hat{k})$ N/C

(2) $216.9(-\hat{i} - 3\hat{j} - \hat{k})$ N/C

(3) $246.6(-\hat{i} - \hat{j} - \hat{k})$ N/C

(4) $246.6(-\hat{i} - 3\hat{j} - \hat{k})$ N/C

19. The temperature of an ideal gas is increased from 27°C to 927°C. The rms speed of its molecules becomes;

(1) twice
(2) half
(3) four times
(4) one-fourth

20. **Assertion (A):** The electric potential at point A is 10 V and at point B is –30 V. The work done by electrostatic force in moving an electron slowly from B to A is -6.4×10^{-18} J.

Reason (R): When a negative charge moves from a lower potential to higher potential, work done by the electric force is positive.

(1) Both **Assertion** and **Reason** are true and the **Reason** is correct explanation of the **Assertion.**
(2) Both **Assertion** and **Reason** are true but **Reason** is not the correct explanation of **Assertion.**
(3) **Assertion** is true, but the **Reason** is false.
(4) **Assertion** is false but the **Reason** is true.

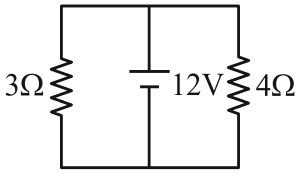
21. The average kinetic energy of the molecules of an ideal gas at 17°C has the value E. The temperature at which the kinetic energy of the same gas becomes $3E$ is;

(1) 17°C
(2) 273°C
(3) 51°C
(4) 597°C

22. A planet in a distant solar system is 8 times more massive than the earth and its radius is 8 times smaller. Given that the escape velocity from the earth is 11 kms^{-1}, the escape velocity from the surface of the planet would be;

(1) 8.8 kms^{-1}
(2) 9.8 kms^{-1}
(3) 88 kms^{-1}
(4) 880 kms^{-1}

23. The current through 3 Ω and 4 Ω resistance in the circuit given below is;



(1) 3 A and 4 A respectively
(2) 4 A and 3 A respectively
(3) 3 A and 3 A respectively
(4) 4 A and 4 A respectively

24. Assuming Newton's law of cooling to be valid. The temperature of body changes from 60°C to 40°C in 7 minutes. If the temperature of surroundings is 10°C, then the temperature of the body after next 7 minutes will be;

(1) 30°C
(2) 28°C
(3) 20°C
(4) 18°C

25. A point charge is placed at the center of a spherical Gaussian surface. Read the given statements carefully and identify the option containing **correct** statement/s.

Statement I: If the sphere is replaced by a cube of different volume charge being inside, then the electric flux remains the same.

Statement II: If the charge is moved off-center in the sphere (still remaining inside), then the electric flux changes.

Statement III: A second charge is placed near the outside of the original sphere, still the electric flux remains the same.

(1) I and II
(2) I and III
(3) I, II and III
(4) II and III

26. The energy of a conducting sphere of radius 2 cm if it is charged to 300 volts is;

(1) 10^{-5} J (2) 10^{-6} J
(3) 10^{-7} J (4) 10^{-8} J

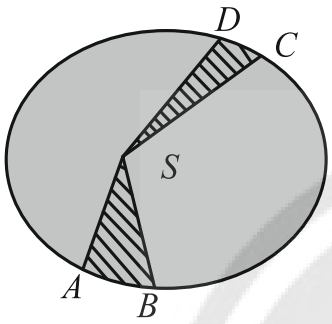
27. The coefficient of linear expansion of steel and brass are 11×10^{-6}/°C and 19×10^{-6}/°C, respectively. If their difference in lengths at all temperatures has to be kept constant at 30 cm, then their lengths at 0°C should be;

(1) 71.25 cm and 41.25 cm
(2) 82 cm and 52 cm
(3) 92 cm and 62 cm
(4) 62.25 cm and 32.25 cm

28. Two-point charges q_1 and q_2 placed at a distance of 44 m from each other in air interact with a certain force. The same charges are now put in oil whose relative permittivity is 4. If the net force between them is still the same, then their separation now is;

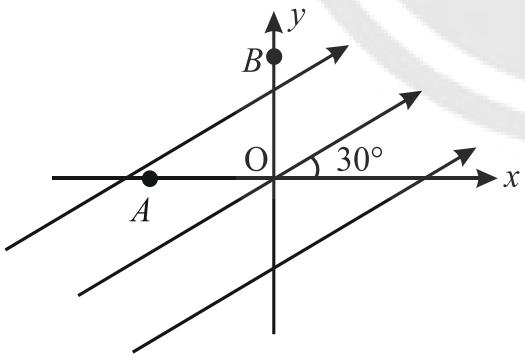
(1) 20 m
(2) 22 m
(3) 44 m
(4) 88 m

29. The figure represents an elliptical orbit of a planet around sun. The planet takes time T_1 to travel from A to B and it takes time T_2 to travel from C to D. If the area CSD is twice that of area ASB, then;



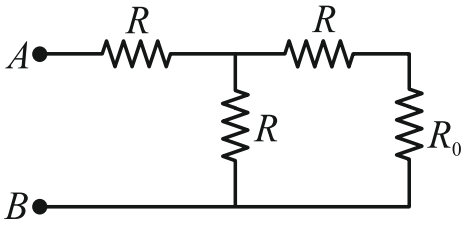
(1) $T_1 = T_2$
(2) $T_1 = 2T_2$
(3) $T_1 = 0.5T_2$
(4) $T_1 = 2.5T_2$

30. A uniform electric field of 120 V/m is directed at 30° with the positive x-axis as shown in figure. If OA = 3 m and OB = 2 m, then the potential difference, V_{BA} is;



(1) $60\left(2+3\sqrt{3}\right)$ V
(2) $-60\left(2+3\sqrt{3}\right)$ V
(3) $60\left(3+2\sqrt{3}\right)$ V
(4) $-60\left(3+2\sqrt{3}\right)$ V

31. In the circuit shown in figure, the total resistance between points A and B is R_0. The value of resistance R is;



(1) R_0 (2) $\sqrt{3}R_0$
(3) $\frac{R_0}{2}$ (4) $\frac{R_0}{\sqrt{3}}$

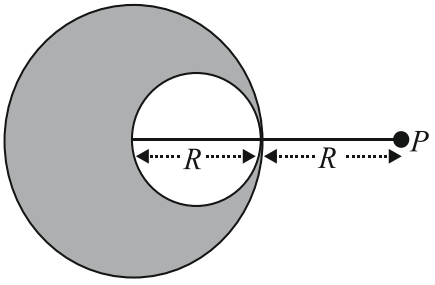
32. **Assertion (A):** The resistivity of semiconductor decreases with increase of temperature.
Reason (R): In a conducting solid, the rate of collisions between free electrons and ions increases with increase of temperature.

(1) Both **Assertion** and **Reason** are true and the **Reason** is correct explanation of the **Assertion.**
(2) Both **Assertion** and **Reason** are true but **Reason** is not the correct explanation of **Assertion.**
(3) **Assertion** is true, but the **Reason** is false.
(4) **Assertion** is false but the **Reason** is true.

33. At a far away distance r along the axis from an electric dipole, electric field is $\vec{E}$. The electric field at distance $\frac{r}{2}$ along the perpendicular bisector is;

(1) $-\vec{E}$ (2) $-4\vec{E}$
(3) $4\vec{E}$ (4) $-\frac{\vec{E}}{4}$

34. A solid sphere of uniform density and radius R exerts a gravitational force of attraction 'F_1' on a particle P placed at a distance of $2R$ from the center of the sphere. A spherical cavity of radius $\frac{R}{2}$ is now formed in the sphere as shown in figure. The sphere with cavity now applies a gravitational force 'F_2' on the same particle P placed at the same position. The ratio $\frac{F_2}{F_1}$ is;



(1) 1 : 9 (2) 9 : 1
(3) 7 : 9 (4) 9 : 7

35. Kinetic energy given to a particle on the surface of a planet is E_0 and potential energy is $-\frac{E_0}{3}$. If the particle escapes to infinity, then the approximate kinetic energy of the particle at infinity is;

(1) $0.25E_0$

(2) $0.5E_0$

(3) $0.67E_0$

(4) $0.9E_0$

SECTION-B

36. Two charges each of magnitude Q are fixed at $2a$ distance apart and a third charge q of mass m is placed at the mid-point of the line joining the two charges; all charges being of the same sign. If q charge is slightly displaced from its position along the line and released, then its time period of oscillation is;

(1) $2\pi\sqrt{\frac{ma^3\pi\varepsilon_0}{Qq}}$

(2) $2\pi\sqrt{\frac{ma^3\pi\varepsilon_0}{Q}}$

(3) $2\pi\sqrt{\frac{ma^2\pi\varepsilon_0}{q}}$

(4) $2\pi\sqrt{\frac{ma^2\pi\varepsilon_0}{Qq}}$

37. Four identical cells, each of e.m.f. 2 V are joined in parallel providing current to an external circuit consisting of two 15 Ω resistors joined in parallel. The terminal voltage of the equivalent cell as read by an ideal voltmeter is 1.6 V. The internal resistance of each cell is;

(1) 7.5 Ω

(2) 5.5 Ω

(3) 3.2 Ω

(4) 2.5 Ω

38. Water rises up in a glass capillary upto a height of 10.0 cm, while mercury falls down by 5.0 cm in the same capillary. Assume angles of contact for water-glass and mercury-glass interface as 0° and 135° respectively. The approximate ratio of surface tension of mercury and water is; (cos 135° = − 0.71)

(1) 7.23

(2) 8.63

(3) 9.58

(4) 10.23

39. A point charge q_1 is held stationary at the origin. A second charge q_2 is placed at a point a, and the electric potential energy of the pair of charges is -7.2×10^{-8} J. When the second charge q_2 is moved to point b, the electric force does 3.6×10^{-8} J of work on the charge. What is the electric potential energy of the pair of charges when the second charge q_2 is at point b?

(1) -3.6×10^{-8} J

(2) -10.8×10^{-8} J

(3) 3.6×10^{-8} J

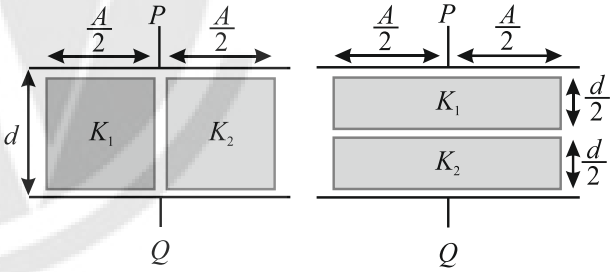
(4) 10.8×10^{-8} J

40. Three identical particles each of mass M are placed at the corners of an equilateral triangle of side $2l$. The work done by external force to increase the side of triangle from $2l$ to $4l$ is;

(1) $-\frac{3}{4}\frac{GM^2}{l}$ (2) $\frac{-2GM^2}{l}$

(3) $\frac{3}{4}\frac{GM^2}{l}$ (4) $\frac{2GM^2}{l}$

41. In the arrangement shown in figure, dielectric constant $K_1 = 3$ and $K_2 = 4$. If the capacitance across P and Q in 1st and 2nd case are C_1 and C_2 respectively, then $C_1 : C_2$ will be;
(The gaps shown are negligible)



(1) 49 : 48

(2) 48 : 49

(3) 12 : 1

(4) 1 : 12

42. A resistance of 2 Ω is connected across one gap of meter bridge (the length of the wire is 100 cm) and an unknown resistance, greater than 2 Ω, is connected across the other gap and the bridge is balanced. When these resistances are interchanged, the balance point shifts by 20 cm. Neglecting any corrections, the unknown resistance is;

(1) 3 Ω

(2) 4 Ω

(3) 5 Ω

(4) 6 Ω

43. A proton is released from rest, 10 cm from a charged sheet having charge density of -2.21×10^{-9} C/m^2. The proton will strike the sheet after an approximate time of;
(Take $\varepsilon_0 = 8.86 \times 10^{-12}$ C^2/Nm^2 and $m_p = 1.6 \times 10^{-27}$ kg)
(1) $4\mu s$
(2) $2\mu s$
(3) $2\sqrt{2}\,\mu s$
(4) $4\sqrt{2}\,\mu s$

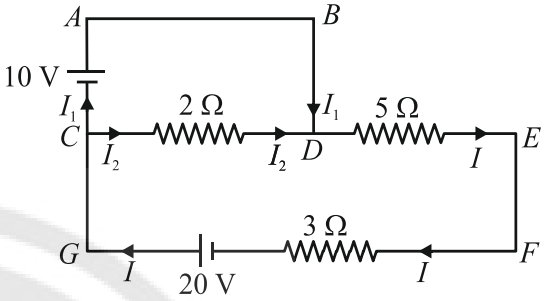
44. Eight spherical raindrops of equal size are falling vertically through air with a terminal velocity of 1 m/s. What would be the terminal speed if these drops were to coalesce to form a larger spherical drop?
(1) 0.25 m/s
(2) 1 m/s
(3) 4 m/s
(4) 8 m/s

45. A sky lab of mass 2×10^3 kg is first launched from the surface of earth in a circular orbit of radius $3R$ and then it is shifted from this circular orbit to another circular orbit of radius $5R$. The energy required to shift the lab from first orbit to the second orbit is;
(R = 6400 km, g = 10 m/s^2)
(1) 0.56×10^{10} J
(2) 0.85×10^{10} J
(3) 1.26×10^{10} J
(4) 2×10^{10} J

46. Three charges $-q$, $+q$ and $+q$ are situated in X-Y plane at points $(0, -a)$, $(0, 0)$ and $(0, a)$ respectively. The potential at a distant point r ($r >> a$) in a direction making an angle θ from the Y-axis is;
(1) $\frac{kq}{r}\left[1-\frac{2a\sin\theta}{r}\right]$
(2) $\frac{kq}{r}\left[1+\frac{2a\sin\theta}{r}\right]$
(3) $\frac{kq}{r}\left[1+\frac{2a\cos\theta}{r}\right]$
(4) $\frac{kq}{r}\left[1-\frac{2a\cos\theta}{r}\right]$

47. A body of weight 15 N hangs from a long spring of stiffness such that an extra force of 6 N stretches the spring additionally by 0.04 m. If the body is pulled downward and released to execute SHM, then the time period of oscillations is; (Take g = 10 m/s^2)
(1) 0.224 s
(2) 0.314 s
(3) 0.628 s
(4) 0.689 s

48. In the network shown in the figure, the value of I_1 through 10 V battery is;



(1) $\frac{32}{3}$ A
(2) $\frac{35}{4}$ A
(3) $\frac{16}{5}$ A
(4) $\frac{16}{3}$ A

49. A gas is compressed adiabatically such that the volume becomes one fifth of the volume at 30°C. If $\gamma = 1.4$, the new temperature will be;
(Take 0°C = 273 K)
(1) $303 \times (5)^{0.4}$ K
(2) $303 \times (5)^{1.4}$ K
(3) $303 \times (2)^{0.4}$ K
(4) $303 \times (2)^{1.4}$ K

50. A sonometer wire under a tension of 12 kg weight is in unison with a tuning fork of frequency 300 Hz. To make the wire vibrate in unison with a tuning fork of frequency 270 Hz, the tension should be;
(1) decreased by 3.6 kg wt
(2) increased by 3.6 kg wt
(3) decreased by 2.28 kg wt
(4) increased by 2.28 kg wt

(CHEMISTRY)

SECTION-A

51. The atomic number of an element is 115. In which of the following period and group it will be placed;
(1) 7^{th} period, group 1^{st}
(2) 8^{th} period, group 14^{th}
(3) 7^{th} period, group 15^{th}
(4) 6^{th} period, group 3^{rd}

52. For gaseous like X, Y, Z and W has Henry's constant values (K_H) are 69.169, 444.979, 0.443 and 2.67. The gas which is more soluble in liquid is;
(1) X (2) Z
(3) Y (4) W

53. Which of the following is best leaving group?
(1) $H_3C-\overset{\ominus}{O}$ (2) $H_3C-\overset{O}{\underset{O}{\overset{\|}{\underset{\|}{S}}}}-\overset{\ominus}{O}$
(3) $H_3C-\overset{\ominus}{C}H_2$ (4) $H_3C-\overset{\ominus}{N}H$

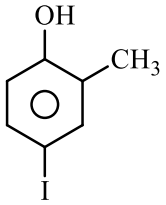
54. Which of the following order is **correct** for any 1 electron species?
(1) $(E_2 - E_1) > (E_3 - E_2) > (E_4 - E_3)$
(2) $(E_2 - E_1) < (E_3 - E_2) < (E_4 - E_3)$
(3) $(E_2 - E_1) = (E_3 - E_2) = (E_4 - E_3)$
(4) $(E_2 - E_1) = \frac{1}{4}(E_3 - E_2) = \frac{1}{9}(E_4 - E_3)$

55. Calculate the volume by volume percentage in the solution of 15 ml of alcohol in 75 ml of water;
(1) 1.66
(2) 166.6
(3) 16.67
(4) 17.99

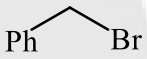
56. When an element forms an oxide, in which oxygen is 30% of the oxide by mass. The equivalent mass of the element will be?
(1) 17.66 (2) 18.66
(3) 19.66 (4) 20.66

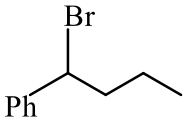
57. The pair of largest and smallest size species among the following species is (respectively);
Mg, Mg^{2+}, Al, Al^{3+}, O^{2-}, F^-, N^{3-}, Na^+
(1) N^{3-}, Mg^{2+}
(2) N^{3-}, Al^{3+}
(3) O^{2-}, Al^{3+}
(4) F^-, Mg

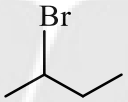
58. **Assertion (A):** The IUPAC name of:

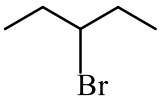


is 4-iodo-6 methyl phenol.
Reason (R): The hydroxy group present on the benzene ring is called phenol.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

59. Which of the following is **most** reactive towards S_N1 reaction?
(1) 

(2) 

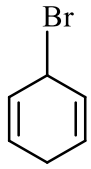
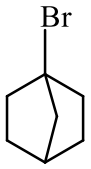
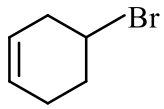
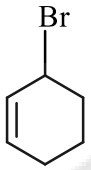
(3) 

(4) 

60. An aqueous solution of methanol in water has vapour pressure;
(1) equal to that of water
(2) equal to that of methanol
(3) more than that of water
(4) less than that of water

61. **Assertion (A):** Average oxidation state of sulphur in $Na_2S_2O_3$ and $Na_2S_4O_6$ are +2 and +3 respectively.
Reason (R): In the above compounds the oxidation number of sodium and oxygen are +1 and –2 respectively.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

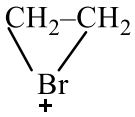
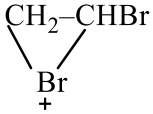
62. Elevation in boiling point was 0.60°C when 5 g of a compound (X) was dissolved in 100 g of water. Molecular weight of (X) is;
Given: [K_b = 0.52 K k mol^{-1}]
(1) 4.433
(2) 43.33
(3) 4.33
(4) 44.33

63. S_N2 reaction will be negligible in?
(1) 
(2) 
(3) 
(4) 

64. The vapour pressure of pure $CHCl_3$ and CH_2Cl_2 are 200 and 41.5 atm respectively. The weight of $CHCl_3$ and CH_2Cl_2 are 11.9g and 17g respectively in a solution. The vapour pressure of solution (in atm) will be;
(1) 80.5 (2) 79.5
(3) 94.3 (4) 105.3

65. **Statement I:** First ionisation energy of Mg is lesser than aluminium.
Statement II: Electron affinity of oxygen is greater than sulphur.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

66. **Assertion (A):** 2-Hexyne gives trans-2-hexene on treatment with Na/liq NH_3.
Reason (R): When alkyne reacts with lindlar catalyst, cis alkene form.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

67. Ethylene reacts with Br_2 to give 1,2 dibromoethane. The anti-addition takes place due to formation of the intermediate;
(1) $CH_3\overset{-}{C}H_2 + \overset{+}{C}H_2$
(2) 
(3) 
(4) $Br\,CH = \overset{+}{C}H$

68. If mole fraction of the solvent in solution decreases then;
(1) Vapour pressure of solution increases
(2) Boiling point decrease
(3) Osmotic pressure increases
(4) All of these

69. Among the following alkyl iodide fastest elimination of HI will be observed in;
(1) Ethyl iodide
(2) Propyl iodide
(3) Isopropyl iodide
(4) t-Butyl iodide

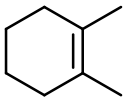
70. Match of the **List-I** with **List-II** and choose the **correct** option.

	List-I		**List-II**
(A)	$1s^2$	(I)	Element shows highest negative oxidation state
(B)	$1s^2\ 2s^2\ 2p^5$	(II)	Element shows highest first ionisation enthalpy
(C)	$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^5$	(III)	Element shows highest E.N on pauling scale
(D)	$1s^2\ 2s^2\ 2p^2$	(IV)	Element shows maximum e^- gain enthalpy (most exothermic)

(1) A-II, B-III, C-IV, D-I
(2) A-III, B-II, C-IV, D-I
(3) A-III, B-II, C-I, D-IV
(4) A-I, B-III, C-IV, D-II

71. **Assertion (A):** The hydroxyl group of an alcohol is replaced by halogens by the help of HBr, PCl_3, $SOCl_2$, Red P + Br_2 type reagents.
Reason (R): The best method for replacement of the hydroxyl group is reacting with $SOCl_2$.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

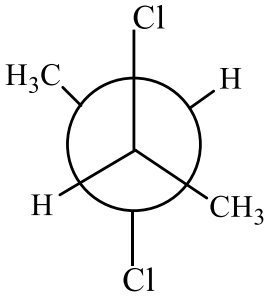
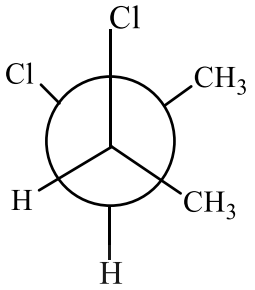
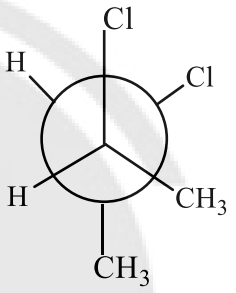
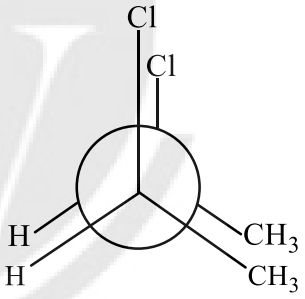
72. If P_o and P_S are the vapour pressure of solvent and its solution respectively.
N_1 and N_2 are the mole fraction of solvent and solute respectively then?
(1) $Ps = \frac{P_o}{N_2}$
(2) $P_o - Ps = P_oN_2$
(3) $Ps = P_oN_2$
(4) $\frac{P_o - Ps}{Ps} = \frac{N_1}{(N_1 + N_2)}$

73.  $+ Br_2 \xrightarrow{CCl_4} (A)$
Number of product(s) in the reaction is/are;
(1) 1 (2) 2
(3) 3 (4) 4

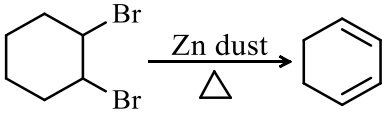
74. **Assertion (A):** Internal energy is a state function and also an extensive property.
Reason (R): State functions are the values which depend on the state of the substance.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

75. Screening effect is **not** observed in;
(1) He^+ (2) Li^{2+}
(3) H (4) All of these

76. In which of the following pairs, the metallic/ionic radius are **not** equal to each other (approximately)?
(1) Li, Mg (2) Be, Al
(3) C, O (4) B, Si

77. Which one of the following is most stable conformer?
(1) 
(2) 
(3) 
(4) 

78. When Na_2O and Cl_2O_7 reacts with water, the nature of the product will be respectively?
(1) Strong base, Strong Acid
(2) Strong base, Weak Acid
(3) Weak base, Strong Acid
(4) Weak base, Weak Acid

79. Which reaction product is **wrong** major product?
(1) 
(2) $CH_3CH_2CH_2Br \xrightarrow{NaI,\ Acetone} CH_3CH_2CH_2I$
(3) $CH_3{-}\underset{Br}{CH}{-}\underset{Br}{CH}{-}CH_3 \xrightarrow[\triangle]{Zn\ dust} CH_3CH{=}CHCH_3$
(4) $CH_3CH_2CHCl_2 \xrightarrow[(II)\ H^+]{(I)NaNH_2,excess} CH_3C{\equiv}CH$

80. The extent to which a solute is dissociated or associated can be expressed by van't Hoff factor (i). Out of the following options which has same Van't hoff factor (i) as that of Hg_2Cl_2?

(1) NaCl
(2) Na_2SO_4
(3) $Al(NO_3)_3$
(4) $Al_2(SO_4)_3$

81. $CH_3-CH_2-CH_2-Br \xrightarrow[DMSO]{KCN} CH_3-CH_2-CH_2-CN$

In the given reaction, the rate of the reaction will be affected by;

(1) [CH_3–CH_2–CH_2–Br] Only
(2) [KCN] only
(3) [CH_3–CH_2–CH_2–Br] and [KCN] both
(4) [DMSO]

82. Which of the following can change the ionic product of water?

(1) an acid addition.
(2) a base addition.
(3) Either an acid or a base addition.
(4) The temperature change.

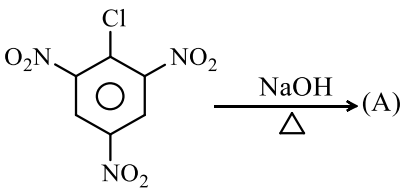
83. The ionisation potential of isotopes of an element will be;

(1) Same
(2) Different
(3) Depends on atomic masses
(4) Depends on number of neutrons

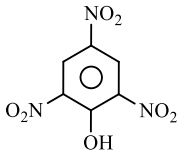
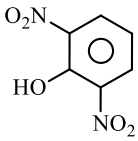
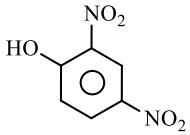
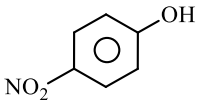
84. Match of the **List-I** with **List-II** and choose the **correct** option.

List-I (Properties)		**List-II (Decreasing order)**	
(A)	Ionisation Energy	(I)	$Ne > Na^+$
(B)	Radii	(II)	S > O
(C)	Electro negativity	(III)	Hf > Zr
(D)	Electron gain enthalpy (Magnitude only)	(IV)	$[He]2s^22p^4 > [He]2s^22p^3$

(1) A-I, B-II, C-III, D-IV
(2) A-IV, B-II, C-III, D-I
(3) A-IV, B-I, C-II, D-III
(4) A-III, B-I, C-IV, D-II

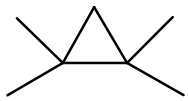
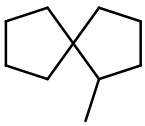
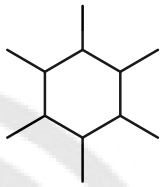
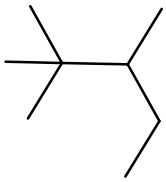
85. 

In the given reaction the major product (A) is;

(1) 
(2) 
(3) 
(4) 

SECTION-B

86. Which of the following compound contain only two types of carbon atom?

(1) 
(2) 
(3) 
(4) 

87. Which of the following is **true** when benzene and toluene are mixed?

(1) $\Delta H_{mix} = \Delta V_{mix} = 0$
(2) $\Delta H_{mix} < \Delta V_{mix}$
(3) $\Delta H_{mix} = \Delta V_{mix} = 1$
(4) $\Delta H_{mix} > \Delta V_{mix}$

88. The electron affinity values for the halogens shows the following trend;

(1) F < Cl > Br > I
(2) F < Cl < Br < I
(3) F > Cl > Br > I
(4) F < Cl > Br < I

89. Which of the following reactions involve disproportionation reaction?

(1) $2H_2SO_4 + Cu \rightarrow CuSO_4 + 2H_2O + SO_2$
(2) $As_2O_3 + 3H_2S \rightarrow As_2S_3 + 3H_2O$
(3) $2KOH + Cl_2 \rightarrow KCl + KOCl + H_2O$
(4) $Ca_3P_2 + 6H_2O \rightarrow 3Ca(OH)_2 + 2PH_3$

90. Consider the reaction:

$(i)(CH_3)_2CH-CH_2Br \xrightarrow{C_2H_5OH} (CH_3)_2CH-CH_2OC_2H_5 + HBr$

$(ii)(CH_3)_2CH-CH_2Br \xrightarrow{C_2H_5O^-} (CH_3)_2CH-CH_2OC_2H_5 + Br^-$

The mechanism of reaction (i) and (ii) are respectively;

(1) S_N2 and S_N1 (2) S_N1 and S_N2
(3) S_N1 and S_N1 (4) S_N2 and S_N2

91. What change is observed in freezing point when mercuric iodide is added to the aqueous solution of potassium iodide;

(1) it is raised. (2) no change.

(3) it is lowered. (4) first raised then low.

92. **Statement I:** Energy of orbit increases as we move away from nucleus.

Statement II: The value of first Bohr radius of hydrogen atom is 0.529×10^{-8} cm.

(1) Statement I and Statement II both are correct.

(2) Statement I is correct, but Statement II is incorrect.

(3) Statement I is incorrect, but Statement II is correct.

(4) Statement I and Statement II both are incorrect.

93. Which of the following configurations represents atom of elements having the **highest** second ionization energy?

(1) $1s^2 2s^2 2p^4$

(2) $1s^2 2s^2 2p^6 3s^2 3p^2$

(3) $1s^2 2s^2 2p^6 3s^1$

(4) $1s^2 2s^2 2p^6 3s^2$

94. Which of the following is amphoteric oxide?

(1) As_2O_3

(2) Na_2O

(3) Cl_2O_7

(4) All of these

95. The molar mass of O_2 and SO_2 are 32 and 64 respectively. At 15°C and 150 mm Hg pressure, one litre of O_2 contain 'N' molecules. The number of molecules in 5 litre of SO_2 under same condition of temperature and pressure will be?

(1) 10 N (2) 5 N

(3) $\frac{5}{N}$ (4) $\frac{1}{10}N$

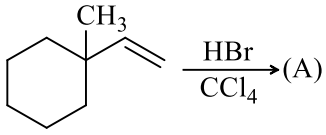
96. Order of nucleophilicity in polar aprotic solvent is;

(1) $I^- > Br^- > Cl^- > F^-$

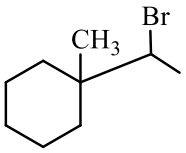
(2) $F^- > Cl^- > Br^- > I^-$

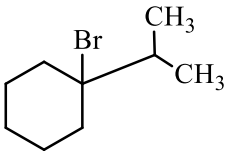
(3) $I^- > Cl^- > Br^- > F^-$

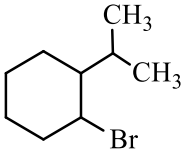
(4) $F^- > I^- > Br^- > Cl^-$

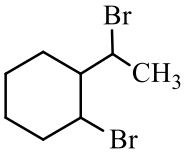
97. 

In the above reaction, the major product (A) is;

(1) 

(2) 

(3) 

(4) 

98. 0.5 mole each of two ideal gases $A\left(C_{V_1 m_1} = \frac{5}{2}R\right)$ and $B\left(C_{V_2 m_2} = 3R\right)$ are taken in a container and expanded reversibly and adiabatically, during this process temperature of gaseous mixture decreased from 350 K to 250 K. Find ΔH (in cal/mol) for the process;

(1) –100 R

(2) –137.5 R

(3) –375 R

(4) 137.5 R

99. **Statement I:** Osmotic pressure of a solution at given temperature decreases with concentration.

Statement II: The order of osmotic pressure of $BaCl_2$ and NaCl is $BaCl_2 > NaCl$.

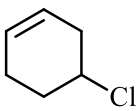
(1) Statement I and Statement II both are correct.

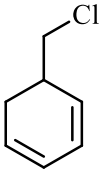
(2) Statement I is correct, but Statement II is incorrect.

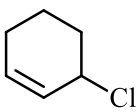
(3) Statement I is incorrect, but Statement II is correct.

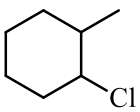
(4) Statement I and Statement II both are incorrect.

100. Which of the following compound give same S_N1 and S_N2 product?

(1) 

(2) 

(3) 

(4) 

(BOTANY)

SECTION-A

101. Trichomes are present on ____.
(1) stems (2) leaves
(3) roots (4) fruits

102. Arrange the following phases during developmental process in a plant cell in correct sequence and choose the **correct** option.
senescence (A), death (B), maturation (C), plasmatic growth (D), meristematic cell (E)
(1) E-D-C-A-B
(2) A-C-D-B-E
(3) E-C-D-B-A
(4) C-D-A-E-B

103. The phytohormone that is in general a plant growth inhibitor, is;
(1) auxin (2) cytokinin
(3) gibberellin (4) ABA

104. **Statement I:** In juvenile conifers, seed production process can be hastened by spraying ethylene on them.
Statement II: GA_3 is used to initiate flowering and for synchronising fruit-set in pineapples.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

105. Influences of ethylene on plants include all the following, **except;**
(1) Horizontal growth of seedlings.
(2) Swelling of the axis in dicot seedlings.
(3) Controlling xylem differentiation and helping in cell division.
(4) Apical hook formation in dicot seedlings.

106. Match **List-I** with **List-II** and choose the **correct** option.

List-I (PGR)			**List-II (Precursor)**
I.	Giberellins	A.	Carotenoids
II.	ABA	B.	Terpenes
III.	Kinetin	C.	Adenine

(1) I(C), II(B), III(A)
(2) I(A), II(C), III(B)
(3) I(B), II(A), III(C)
(4) I(C), II(A), III(B)

107. Pick the **odd** one out w.r.t heterophylly in response to different phases of life.
(1) Coriander
(2) Larkspur
(3) Buttercup
(4) Cotton

108. Which of the following PGRs was discovered as kinetin from the autoclaved herring sperm DNA?
(1) Auxin (2) Abscisic acid
(3) Ethylene (4) Cytokinin

109. **Statement I:** Pollen grains are well preserved as fossils because of the presence of sporopollenin.
Statement II: The intine of pollen grain is made up of sporopollenin.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

110. Select the **correct** option w.r.t the ploidy level of cells mentioned below.

	PMC	**Antipodal**	**Synergid**
(1)	n	n	n
(2)	2n	n	2n
(3)	2n	n	n
(4)	n	2n	n

111. **Assertion (A):** Cleistogamous flowers produce assured seed-set even in the absence of pollinators.
Reason (R): In cleistogamous flowers, the anthers and stigma lie close to each other. When anthers dehisce in the flower buds, pollen grains come in contact with the stigma to effect pollination.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A).**
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A).**
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

112. In which of the following plants, pollination is brought about by wind or insects?
(1) Water lily
(2) *Vallisneria*
(3) *Zostera*
(4) *Hydrilla*

113. If both male and female flowers are present on the same plant such as castor and maize (monoecious), it prevents;

(1) both autogamy and geitonogamy.
(2) both geitonogamy and xenogamy.
(3) geitonogamy but not xenogamy.
(4) autogamy but not geitonogamy.

114. For conducting artificial hybridization, if the mother plant produces unisexual flowers;

(1) There is a need of emasculation and bagging.
(2) There is no need of emasculation and bagging.
(3) There is a need of emasculation but no need of bagging.
(4) There is no need of emasculation but bagging is needed for female plants.

115. Pick the correct statement(s) w.r.t filiform apparatus and choose the **correct** option.

A. Present at the chalazal end of embryo sac.
B. Present as special thickenings at the micropylar tip in synergids.
C. Guides the pollen tube into synergids.

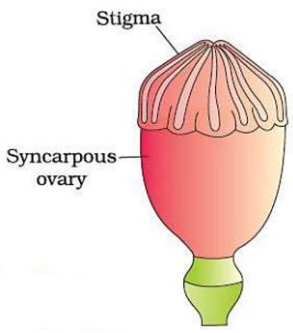
(1) A and B (2) B and C
(3) only B (4) only C

116. Match **List-I** with **List-II** and choose the **correct** option.

List-I		List-II	
I.	Tassels of a corn cob	A.	Produce two types of flowers
II.	*Oxalis*	B.	Flower is 6 feet in height
III.	*Yucca*	C.	Trap pollen grains
IV.	*Amorphophallus*	D.	Gets pollinated by moth

(1) I(C), II(B), III(A), IV(D)
(2) I(A), II(C), III(B), IV(D)
(3) I(D), II(A), III(C), IV(B)
(4) I(C), II(A), III(D), IV(B)

117. Choose the **correct** option representing the figure given below.



(1) Multicarpellary, apocarpous gynoecium of *Michelia.*
(2) Multicarpellary, syncarpous pistil of *Papaver.*
(3) Multicarpellary, syncarpous gynoecium of *Michelia.*
(4) Multicarpellary, apocarpous pistil of *Papaver.*

118. **Assertion (A)**: Taxonomic categories like species, genus and families are based on a number of similar characters.

Reason (R): Generally, order and other higher taxonomic categories are identified based on the aggregates of characters.

(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A).**
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A).**
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

119. **Statement I:** Flagella may be present in prokaryotic as well as eukaryotic cells.

Statement II: Eukaryotic flagella are structurally different from prokaryotic flagella.

(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

120. Choose the **incorrect** statement from the following w.r.t ascomycetes.

(1) They are mostly multicellular and commonly known as sac-fungi.
(2) Mycelium is branched and septate.
(3) Sexual spores are produced exogenously.
(4) *Aspergillus*, *Claviceps*, *Neurospora* are important members of ascomycetes.

121. **Statement I:** Prophase is first stage of karyokinesis.

Statement II: Prophase is marked by the initiation of condensation of chromosomal material.

(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

122. Superior ovary is found in;
(1) hypogynous flower.
(2) perigynous flower.
(3) epigynous flower.
(4) none of these.

123. Initiation of vascular cambium in dicot root during secondary growth occurs from;
(1) thin-walled parenchymatous cells lying next to endodermis.
(2) thick-walled collenchyma cells lying next to pericycle.
(3) thin-walled collenchyma cells lying next to pericycle.
(4) thick-walled parenchymatous cells lying next to endodermis.

124. Protonema stage is a;
(1) creeping, green, unbranched and frequently filamentous stage.
(2) prostate, green, branched and frequently filamentous stage.
(3) creeping, green, branched and frequently filamentous stage.
(4) prostate, non-green, unbranched and frequently filamentous stage.

125. Match **List-I** with **List-II** to find out the **correct** option.

List-I		**List-II**	
I.	RuBisCO	A.	Does not occur in C_4 plants.
II.	Photorespiration	B.	Most abundant enzyme in the world
III.	Calvin pathway	C.	Responsible for fixing CO_2 into PEP.
IV.	PEPcase	D.	Common to both C_3 and C_4 plants.

(1) I(B), II(A), III(C), IV(D)
(2) I(B), II(D), III(C), IV(A)
(3) I(B), II(A), III(D), IV(C)
(4) I(C), II(A), III(D), IV(B)

126. The enzyme involved in ethanolic fermentation is;
(1) hexokinase.
(2) lactate dehydrogenase.
(3) alcohol dehydrogenase.
(4) succinate dehydrogenase.

127. Find out the **incorrect** statement from the following.
(1) Cytosine, Uracil and Thymine are pyrimidines.
(2) Uracil is present in RNA at the place of Adenine.
(3) Cytosine is common for both DNA and RNA.
(4) Adenine and Guanine are purines.

128. Which of the following is **true** for the double helical model of DNA?
(1) The two chains of DNA have anti-parallel polarity.
(2) Adenine binds to thymine by 3 hydrogen bonds.
(3) The backbone is constituted by sugar-phosphate, and the bases project outside.
(4) The pitch of the helix is 34 nm.

129. **Assertion (A):** The transcription and translation can be coupled in bacteria.
Reason (R): In bacteria, the mRNA does not require any processing to become active, and also both transcription and translation take place in cytoplasm.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A).**
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A).**
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

130. All of the following are synthesised by RNA polymerase I in eukaryotes, **except;**
(1) 5.8S rRNA
(2) 28S rRNA
(3) 18S rRNA
(4) hnRNA

131. The codon which has dual functions is ____.
(1) UAA (2) AUG
(3) UGA (4) UAG

132. At which part of the soluble RNA does the amino acid bind?
(1) 5' end
(2) anticodon loop
(3) 3' end
(4) Both 5' and 3' ends

133. The mRNA sequence generated from the coding strand with the sequence given below will be;
5' ATGTCGTAGCTTGCATGAC 3'
(1) 5' AUGUCGUAGCUUGCAUGAC 3'
(2) 3' ATGTCGTAGCTTGCATGAC 5'
(3) 3' AUGUCGUAGCUUGCAUGAC 5'
(4) 5' ATGTCGTAGCTTGCATGAC 3'

134. Match **List-I** with **List-II** to find out the **correct** option.

List-I (Gene)		**List-II (Product)**	
I.	*Lac y*	A.	β-galactosidase
II.	*Lac i*	B.	Transacetylase
III.	*Lac z*	C.	Permease
IV.	*Lac a*	D.	Repressor

(1) I(C), II(B), III(A), IV(D)
(2) I(C), II(D), III(A), IV(B)
(3) I(D), II(A), III(C), IV(B)
(4) I(C), II(A), III(D), IV(B)

135. The process of translation of the mRNA to protein begins when the 'A' subunit of ribosome encounters a 'B'. A and B, respectively, are;
(1) larger, mRNA (2) smaller, tRNA
(3) larger, tRNA (4) smaller, mRNA

SECTION-B

136. **Assertion (A):** One single maize root apical meristem can give rise to more than 17,500 new cells per hour.
Reason (R): Cells in watermelon may increase in size by up to 3,50,000 times.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A).**
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A).**
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

137. Match **List-I** with **List-II** to find out the **correct** option.

List-I (PGR)		**List-II (Associated scientists)**	
I.	Gibberellic acid	A.	Miller et al.
II.	Kinetin	B.	F.W. Went
III.	Ethylene	C.	E. Kurosawa
IV.	Auxin	D.	H.H. Cousins

(1) I(C), II(B), III(A), IV(D)
(2) I(C), II(D), III(A), IV(B)
(3) I(D), II(A), III(C), IV(B)
(4) I(C), II(A), III(D), IV(B)

138. Which of the following has no residual endosperm in the mature seed?
(1) Groundnut
(2) Wheat
(3) Maize
(4) Barley

139. Choose the **incorrectly** matched pair.
(1) Micropyle: facilitates entry of oxygen and water into the seed during germination.
(2) Mature seed: 10-15 per cent moisture by mass.
(3) Dormancy: inactive state of embryo during favourable conditions.
(4) False fruits: apple, strawberry, cashew.

140. Mark the following statements as **true (T)** or **false (F)** w.r.t growth rate and choose the **correct** option.
A. In arithmetic growth, following mitotic cell division, only one daughter cell continues to divide while the other differentiates and matures.
B. In geometric growth, both the progeny cells following mitotic cell division retain the ability to divide and continue to do so.
C. Arithmetic growth is exemplified by root elongating at a constant rate.
D. Stages during embryo development shows both geometric and arithematic phases.

	A	**B**	**C**	**D**
(1)	T	T	T	T
(2)	F	F	F	F
(3)	T	F	T	F
(4)	F	T	T	T

141. **Assertion (A):** In opposite phyllotaxy, a pair of leaves arise at each node and lie opposite to each other.
Reason (R): Opposite phyllotaxy is found in guava and *Alstonia*.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A).**
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A).**
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

142. Identify the **incorrect** statement from the following w.r.t nucleolus.

(1) Spherical structure present in the nucleoplasm.
(2) Membrane less structure.
(3) Site of active ribosome synthesis.
(4) The content of nucleolus is continuous with the rest of the nucleoplasm.

143. Zygotene stage of meiosis is characterised by how many of the following events?

A. Chromosomes start pairing together.
B. Non-homologous chromosomes get paired.
C. Synapsis occurs between homologous chromosomes.
D. Formation of synaptonemal complex in homologous chromosomes.
E. Formation of synaptonemal complex in non-homologous chromosomes.

Choose the **correct** option.

(1) 5
(2) 2
(3) 3
(4) 4

144. Which of the following statement(s) is/are **wrong**?

A. Protein is the favoured substrate for respiration.
B. Respiratory pathway is an amphibolic pathway.
C. Fatty acids would be broken down to acetyl CoA before entering the respiratory pathway when it is used as a substrate.

(1) Only A
(2) Only C
(3) Only B
(4) A and C

145. The concentration of CO_2 beyond which the CO_2 becomes damaging over longer periods is;

(1) 0.03%
(2) 0.04%
(3) 0.05%
(4) 0.01%

146. **Statement I:** RNA being unstable mutates at a faster rate than DNA.

Statement II: The presence of Thymine at the place of Uracil also confers additional stability to DNA.

(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

147. A hybrid DNA molecule having ^{15}N (heavy isotope of nitrogen) in one strand and ^{14}N in the other was allowed to replicate in a medium containing ^{14}N only. After 4 generations, how many DNA molecules will have hybrid DNA?

(1) One
(2) Two
(3) Fifteen
(4) Zero

148. Match **List-I** with **List-II** to find out the **correct** option w.r.t transcription in eukaryotes.

List-I		**List-II**	
I.	Tailing	A.	Terminate the process of transcription
II.	Capping	B.	Initiate the process of transcription
III.	σ factor	C.	Adding methyl guanosine triphosphate
IV.	ρ factor	D.	Adding adenylate residues

(1) I(D), II(B), III(A), IV(A)
(2) I(C), II(D), III(A), IV(B)
(3) I(D), II(C), III(B), IV(A)
(4) I(C), II(A), III(D), IV(B)

149. A molecule that can act as a genetic material must fulfill certain criteria. Which of the given criteria is an **incorrect** one?

(1) It should be able to generate its replica.
(2) It should be stable chemically and structurally.
(3) It should provide the scope for fast changes (mutation) that are required for evolution.
(4) It should be able to express itself in the form of 'Mendelian Characters'.

150. All the following statements are true for VNTRs, **except** that they**;**

(1) show very low degree of polymorphism.
(2) are mini-satellite DNA.
(3) are used as a probe in DNA fingerprinting.
(4) have size range from 0.1 to 20 kb.

(ZOOLOGY)

SECTION-A

151. In phylum Mollusca, body is divided into;
(1) head, thorax and abdomen.
(2) head, muscular foot and abdomen.
(3) head, thorax and visceral hump.
(4) head, muscular foot and visceral hump.

152. The **correct** order of chemical composition of living tissues/cells in terms of percentage of the total cellular mass is;
(1) Nucleic acid > Protein > Water > Carbohydrate > Ions > Lipid
(2) Water > Protein > Nucleic acid > Carbohydrate > Lipid > Ions
(3) Water > Protein > Carbohydrate > Nucleic acid > Lipid > Ions
(4) Lipid > Ions > Carbohydrate > Water > Protein > Nucleic acid

153. **Statement I**: The exchange part is the site of the actual diffusion of O_2 and CO_2 between blood and atmospheric air.
Statement II: Vertebral column forms the lateral side of thoracic chamber.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

154. Find the total number of hormones from the box given below, which binds to intracellular receptors.

Cortisol, Testosterone, T_3, Glucagon, Oxytocin, FSH, Progesterone, Estrogen, GH

(1) Four (2) Five
(3) Six (4) Seven

155. Which statement is **incorrect** about *Pleurobrachia*?
(1) It is radially symmetrical
(2) It has tissue level of organisation.
(3) It has comb plates.
(4) It is triploblastic.

156. Choose the **incorrect** statement from the following.
(1) Primary metabolites have identifiable functions.
(2) Some secondary metabolites have ecological importance.
(3) Secondary metabolites like rubber, drugs, spices, and pigments are useful for human welfare.
(4) Secondary metabolites are not found in fungi and microbes.

157. Sea fan belongs to phylum;
(1) Coelenterata (2) Porifera
(3) Echinodermata (4) Mollusca

158. Which of the following sequence is truly a systemic circulation pathway?
(1) Right ventricle → Pulmonary aorta → Tissues → Pulmonary veins → Left atria
(2) Right atria → Left ventricle → Aorta → Tissues → Veins → Right atria
(3) Left atria → Left ventricle → Pulmonary aorta → Tissues → Right atria
(4) Left atria → Left ventricle → Aorta → Arteries → Tissues →Veins → Right atria

159. Select the **incorrect** statement.
(1) GIT secretes four major peptide hormone.
(2) Several non-endocrine tissues secrete hormones called growth factors.
(3) Hormone receptors are located in target tissue only.
(4) Hormone receptors are non-specific in nature.

160. Which of the following statement is **incorrect**?
(1) All the elements present in a sample of earth's crust are also present in a sample of living tissue.
(2) Relative abundance of carbon and hydrogen with respect to other elements is higher in any living organisms than in earth's crust.
(3) Living organisms have more nitrogen and oxygen than earth crust.
(4) Living organisms have more Ca, Mg and Na than earth crust.

161. Among the following, gregarious pest is;
(1) Locust (2) Mosquito
(3) White ants (4) Bed bug

162. Choose **odd one out** from the given amino acids.
(1) Lysine (2) Tyrosine
(3) Phenylalanine (4) Tryptophan

163. The limbless amphibian is;
(1) *Ichthyophis* (2) *Hyla*
(3) *Rana* (4) *Salamandra*

164. Following are the functions of which hormone?
A. Anabolic effects on protein and carbohydrate metabolism.
B. Influence libido.
C. Muscular growth, aggressiveness, low pitch voice.
(1) Estrogen (2) Progesterone
(3) Testosterone (4) Thyroxine

165. Amino acids can be classified by the;
(1) number of peptide bonds.
(2) number of disulphide bonds they can form.
(3) number of carbon-carbon double bonds.
(4) characteristics of their side chains.

166. Urochordate animals have;
(1) notochord that extends from head to tail region.
(2) notochord is present throughout larval stages and adult life.
(3) notochord present only in adult stages.
(4) notochord present only in larval stage.

167. **Statement I**: A particular property of amino acids is the ionizable nature of $–NH_2$ and –COOH groups.
Statement II:In solutions of different pH, the structure of amino acids changes.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

168. Which one of the following group of animals is **correctly** matched with its one characteristic feature without even a single exception?
(1) Mammalia → Give birth to young ones
(2) Reptilia → Possess 3-chambered heart with one incompletely divided ventricle
(3) Chordata → Possess a mouth provided with an upper and a lower jaw
(4) Chondrichthyes → Possess cartilaginous endoskeleton

169. Which of the following is **incorrect** about glycogen?
(1) It is a stored form of glucose in plants.
(2) In this, right end is reducing and left end is non-reducing.
(3) It is a branched polymer of glucose.
(4) It is a homopolysaccharide.

170. Choose the **correct** option.
(1) Phylum Porifera → Presence of choanocytes and nematocysts
(2) Phylum Coelentrata → *Meandrina* belongs to this phylum
(3) Phylum Ctenophora → All exhibit bilateral symmetry
(4) Phylum Platyhelminthes → *Wuchereria* belongs to this phylum

171. What is the elemental composition of oxygen in human body?
(1) 65% (2) 46.6%
(3) 18.5% (4) 3.3%

172. Select the **wrong** statement.
(1) Arthropods are mostly dioecious.
(2) *Nereis* have lateral appendages which helps in swimming.
(3) Nematocysts are characteristic of phylum Cnidaria.
(4) Porifers are exclusively marine.

173. Polyp phase is absent in___.
(1) *Hydra*
(2) *Aurelia*
(3) *Adamsia*
(4) *Obelia*

174. Identify the **correct** and **incorrect** statements.
A. Human skeleton has 206 bones.
B. There are 12 pairs of ribs in human.
C. Sternum is present on the dorsal side of the body.
D. All mammals have 8 cervical vertebrae.
E. Ribs are bicephalic.

	Correct	**Incorrect**
(1)	A, B, C	D, E
(2)	A, B, D	C, E
(3)	A, B, E	C, D
(4)	A, C, D	B, E

175. The physical and chemical properties of amino acid depends on;
A. Amino group
B. Carboxyl group
C. R-functional group
D. Hydrogen
(1) A only
(2) A, B, C and D
(3) A and B only
(4) A, B and C only

176. All are the functions of insulin **except**;
(1) Glycogenesis.
(2) Increase glucose utilisation by hepatocyte.
(3) Increase glucose utilisation by adipocyte.
(4) Gluconeogenesis.

177. Members of phylum porifera are;
(1) mostly radially symmetrical and acoelomate.
(2) mostly asymmetrical and acoelomate.
(3) mostly radially symmetrical and coelomate.
(4) mostly asymmetrical and coelomate.

178. Cylindrical bodied, worm like marine animals belongs to phylum;
(1) Echinodermata
(2) Mollusca
(3) Coelenterata
(4) Hemichordarta

179. The **correct** sequence of depolarisation and repolarisation is;

A. Stimulus applied at a site on polarised membrane.
B. Increase the permeability of Na^+.
C. Generation of action potential.
D. Increase the permeability for K^+.
E. Restoring of membrane potential.

(1) A → B → C → D → E
(2) B → A → C → D → E
(3) A → D → C → B → E
(4) A → B → D → C → E

180. When we homogenise any tissue in an acid, the acid soluble pool mainly represents;

(1) Cytoplasmic composition
(2) Cell membrane
(3) Nucleus
(4) Mitochondria

181. How much amount of blood is filtered by kidney per second?

(1) 15 ml (2) 20 ml
(3) 120 ml (4) 110 ml

182. Which of the following fish is also known as 'Great white shark'?

(1) *Pristis*
(2) *Trygon*
(3) *Scoliodon*
(4) *Carcharodon*

183. Choose the **incorrect** statement for Arthropods.

(1) They have an open circulatory system.
(2) Their body is divided into head, thorax and abdomen.
(3) They are segmented and coelomate animals.
(4) Fertilisation is usually external in them.

184. Choose the **correct** statements for starfish.

A. Sexes are separate and reproduction is sexual.
B. Development is indirect with free swimming larva.
C. Mouth is present on the dorsal side and anus on the ventral side.

(1) A and C
(2) A and B
(3) A, B and C
(4) B and C

185. How many pairs of spiracles are present on the lateral surface of cockroach?

(1) 5 pairs
(2) 15 pairs
(3) 10 pairs
(4) 20 pairs

SECTION-B

186. **Statement I**: Glucosamine is chemically modified amino acid.

Statement II: Chitin is a homopolymer.

(1) Statement I and Statement Il both are correct.
(2) Statement I is correct but Statement Il is incorrect.
(3) Statement I is incorrect, but Statement Il is correct.
(4) Statement I and Statement Il both are incorrect.

187. Match **List-I** with **List-II** and choose the **correct** option.

List-I		**List-II**	
(A)	6-15 pairs of gill slits	(I)	*Trygon*
(B)	Placoid scales	(II)	Cyclostomes
(C)	Air bladder	(III)	Chondrichthyes
(D)	Poison sting	(IV)	Osteichthyes

	A	**B**	**C**	**D**
(1)	III	IV	I	II
(2)	IV	II	III	I
(3)	I	IV	III	II
(4)	II	III	IV	I

188. The role of receptors associated with the carotid artery and the aortic arch is;

(1) regulation of breathing via sensing fluctuations in blood pressure.
(2) activation of pons of telencephalon to sense chemical changes during breathing.
(3) increase the duration of inspiration and thereby alter the respiratory rate.
(4) sensing chemical changes especially H^+ and CO_2 levels in the blood and responding accordingly.

189. Choose the **incorrect** option.

(1) Elemental analysis of living tissues gives elemental composition of living tissue.
(2) Analysis of chemical composition of living tissue gives idea of its organic and inorganic constituents.
(3) Weight of small amount of living fresh tissue is known as its wet weight.
(4) Acid soluble pool contain lipids, nucleic acids and polysaccharides only.

190. Read the following statements and choose the **correct** answer from the options given below.

A. Metagenesis is observed in Helminths.
B. Echinoderms are triploblastic and coelomate animals.
C. Roundworms have organ-system level of body organization.
D. Comb plates present in ctenophores help in digestion.
E. Water vascular system is characteristic of Porifera.

(1) A, B and C are incorrect
(2) B, C and E are incorrect
(3) A, D and E are incorrect
(4) C, D and E are incorrect

191. **Assertion (A):** Certain amino acids are essential for our health and they have to be supplied through our diet.
Reason (R): Dietary proteins are the source of essential amino acids.

(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

192. Which option related to ECG best represents the increase of blood in ventricles by 30%?

(1) P-Q (2) QRS
(3) S-T (4) T-P

193. **Statement I:** Presence of swim bladders help Chondrichthyes to maintain buoyancy.
Statement II: In Chondrichthyes teeth are modified placoid scales which are forward directed.

(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

194. Lipids are;

(1) compounds of carbon, hydrogen and oxygen.
(2) generally contain both glycerol and fatty acid.
(3) insoluble in water.
(4) All of these.

195. **Assertion (A):** Force generated by the muscles is used to carry out movement through joints.
Reason (R): Joint are points of contact between bones and muscles.

(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

196. Consider the following features.

A. Organ system level of organisation.
B. Bilateral symmetry.
C. True coelomates.

Select the **correct** option of animal groups which possess all the above characteristics.

(1) Annelida, Arthropoda and Chordata
(2) Annelida, Arthropoda and Aschelminthes
(3) Arthropoda, Aschelminthes and Chordata
(4) Annelida, Aschelminthes and Chordata

197. Palmitic acid and arachidonic acid contains ____and_____ number of carbon atoms respectively (excluding carboxyl group).

(1) 16, 19
(2) 15, 19
(3) 16, 20
(4) 18, 20

198. **Assertion (A):** Animals accumulate ammonia, urea, uric acid, carbon dioxide, water and ions like Na^+, K^+, Cl^-, phosphate, sulphate, etc., by excess ingestion only.
Reason (R): These substances have to be removed totally or partially.

(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

199. Identify the following statements as **true** or **false**.

A. Cell aggregate body plan is found in phylum Platyhelminthes.
B. Radial symmetry is the most common symmetry found in animals.
C. Pseudocoelom is found only in phylum Aschelminthes.
D. All triploblastic animals have true coelom.

(1) A is true and B, C and D are false.
(2) B and C are true and A and D are false.
(3) A, B and C are true and D is false.
(4) A, B and D are false and C is true.

200. Arrange in sequence the **correct** order of mode of action of 'FSH'.

A. Binding to membrane receptor.
B. Biochemical response.
C. Generation of second messenger.
D. Physiological response.

(1) A→ B → C → D
(2) A → C → B → D
(3) D → C → B →A
(4) C → A → D → B

■■■

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